Carol: New file "RIV"

DIAL COMM
8*272-9

GENERAL ELECTRIC
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file - BEK

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Mr. J. J. LaForest
PITTSFIELD

As I discussed with you about ten days ago, we are interested in determining whether or not our standard suspension insulator, as per the attached drawing U-1840, can be designed to be more corona-free than is now the case.

Let me digress for just a moment to give you a little background on the overall problem. As you know, our scope of business covers all types of line hardware, such as clamps, yoke plates, and fittings, as well as insulators. In fact, we are concerned with the entire assembly which supports the power conductor to the tower. Sometimes a customer specification will demand that the assembly, when subjected to a given voltage, will have less than a specified amount of RIV. At other times the specification will demand that there be no corona at the specified test voltage. The third possibility is that both a specified RIV level and no visual corona will be required at the test voltage level.

Generally speaking, it is quite feasible to design an assembly to meet the RIV levels specified, and the hardware parts can also be designed to meet the visual corona requirements. But, it becomes quite impossible to design to eliminate visual corona from the insulators, even when using quite elaborate shielding (grading rings). The amounts of visual corona on the insulators do not usually cause very much noise (RIV), at least in comparison with the noise caused by a brush discharge on a piece of hardware.

See the attached curve sheet which shows a generalized plot of RIV versus Test Voltage. The lower section of the curve will be created solely by insulator noise, and the upper part by corona on hardware parts. Usually, the RIV, as caused by the insulators, is about as shown, increasing linearly with test voltage.

As far as I am concerned, where there is RIV there must be corona (at least 10-15 microvolts). Then, the question arises, can we correlate the visual corona levels on the insulators with the RIV curves? The answer is no. The visual corona levels obtained on the insulators depend upon a variety of things such as how dark the laboratory is, how good the observers vision is, and how long the observer has waited to allow his eyes to adjust to the darkness. This situation has created some

major problems for us in that, depending upon how zealous we are in observing corona, we can "look" ourselves right out of specification.

I mentioned that the noise resulting from hardware is generally manifested by brush corona, however, the type of corona on suspension insulators is mostly what we define as "glow" corona (i.e. There is no brush discharge, only a glow or haze of bluish light). This glow can persist and persist as the test voltage is lowered until, depending upon room darkness and observer care, it just disappears from sight (But it must still be there because we have an appreciable RIV level, perhaps only 30-50 microvolts, which is certainly of little consequence on a 500 KV transmission line).

The tabulation below illustrates, in a qualitative way, the change in performance we experience in testing an insulator assembly under two extremes of humidity. For purposes of illustration, assume a constant applied test voltage and the two extremes of humidity are defined as being approximately 0.200 and 0.600 inches of mercury, vapor pressure.

	Low Humidity	High Humidity
RIV Level	High	Low
Visual Corona		
insulator pin-hole	slight glow	glow plus spitting over the first porcelain petticoat
insulator cap	glow to spitting	no corona

The best performance from an RIV standpoint is generally with high humidity which might perhaps be because we can see no corona in the air gap between the bottom of the cap and the top porcelain surface. The corona which is visible in the pin-hole of the insulator at low humidity is a ring of low glow at the cement-porcelain interface, and at high humidity is much the same except that the streamers extend from the glow area outward and "play" over the first petticoat (sometimes to the second petticoat depending upon the voltage level).

Jim, I guess what we want to know is this:

(1) Can you tell us what changes to make in design?
(2) Can you tell us why the above things occur?

Also attached are two characteristic sheets which give the details regarding characteristics of the porcelains. No 1520 is the one which should be primarily used. No. 1521 represents our high strength body,

with slightly different characteristics. However, when we test our insulator made of the latter, we get essentially the same results as with the former regarding corona.

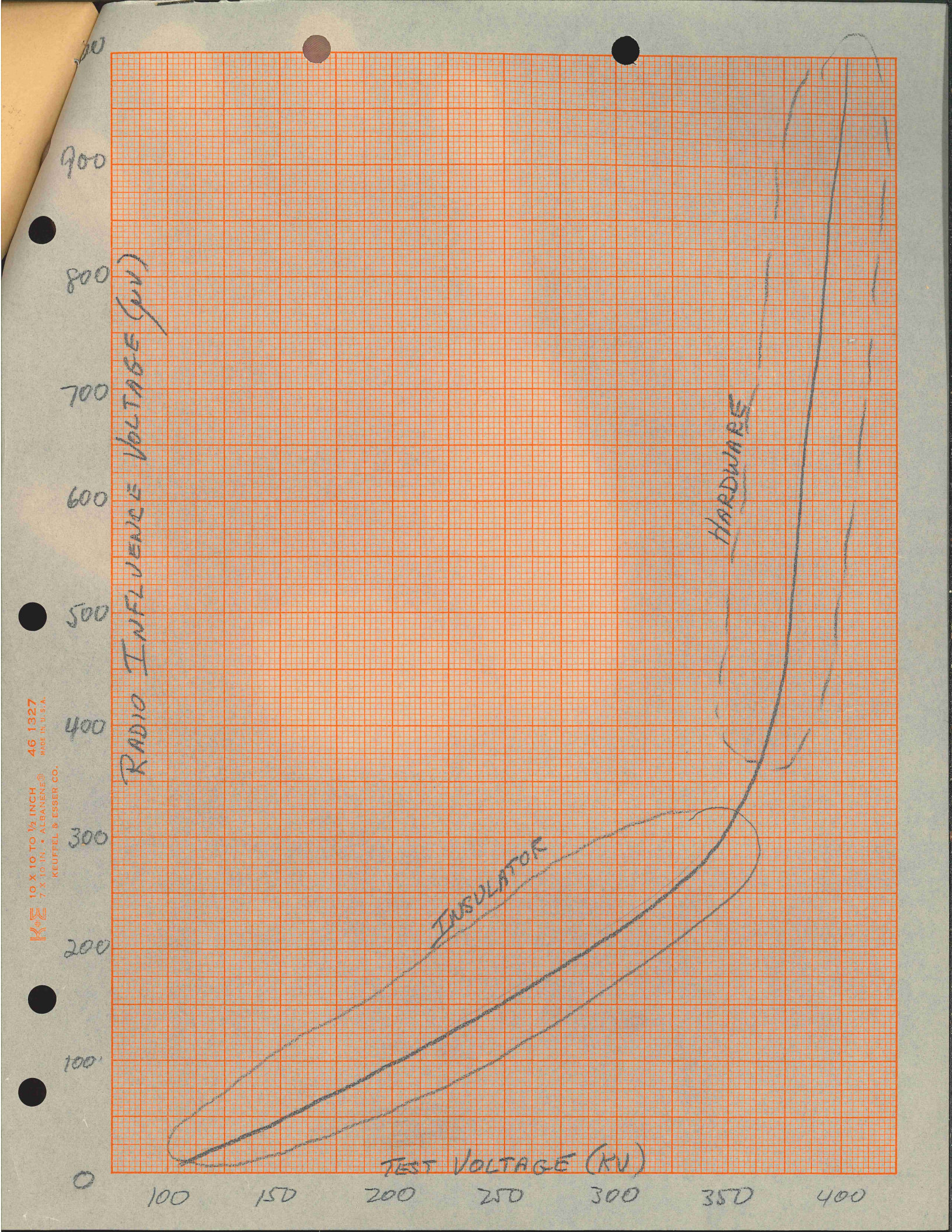
Please let me know what you can do, when you can do it, and how much it will cost.

Very truly yours,

B. E. Kingsbury, Manager
Product Engineering

clk

Attachments (4)


RADIO INFLUENCE VOLTAGE (μV)
900
800
700
600
500
400
300
200
100
0
HARDWARE
INSULATOR
TEST VOLTAGE (KV)
100
150
200
250
300
350
400